

Computer Science

Accelerator pack | Summer 2018

Your Teachers

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Exam Board: OCR

Website: www.ocr.org.uk

Course Specification: <http://www.ocr.org.uk/Images/170845-specification-accredited-as-level-gce-computer-science-h046.pdf>

Summer prep work

It's important that you start the course with a sound understanding of computer programming principles.

Codecademy (www.codecademy.com) is an excellent place to learn and develop programming skills. All of the courses on the website are relevant to your studies as a Computer Scientist. However, good starting points are the JavaScript and Python courses.

TASK 1 | Complete at least one of the courses on Codecademy

In class we will do the majority of our programming in Visual Basic. As such, you will need to familiarise yourself with the language. The following tutorials will help develop your understanding of the language.

- Getting Started with Visual Basic: <https://msdn.microsoft.com/en-us/library/dd492171.aspx>
- Visual Basic for Absolute Beginners: https://mva.microsoft.com/en-US/training-courses/visual-basic-fundamentals-for-absolute-beginners-16507?l=jqMOvLkBC_9206218965
- Various Visual Basic project tutorials: <http://www.tutorialspoint.com/listtutorials/visual-basic/1>

TASK 2 | Complete the attached Introduction to Visual Basic (Activity Workbook)

Your success in AS/A Level Computer Science is dependent on your determination and perseverance with independent study.

Introduction to Visual Basic | Introduction

Module Module1

```
Sub Main()  
    Console.WriteLine("Hello World!")  
    Console.WriteLine("Let's change our text colour to red.")  
    Console.ForegroundColor = ConsoleColor.Red  
    Console.ReadKey()  
    Console.WriteLine("I love red!")  
    Console.ReadKey()  
End Sub
```

End Module

Task 1

1. Copy the above program. Test it to ensure it works.
2. Save your project. Call it "Console Colours".
3. Change the **BackgroundColor** to **Blue** and write "I love Blue!" to the console.
4. Display the names of the colours of the rainbow. Each on a separate line, coloured and in order.

Introduction to Visual Basic | Variables

Module Module1

```
Sub Main()
```

```
    Dim myAge As Integer
```

```
    Dim myName As String
```

```
    myName = "Mark"
```

```
    myAge = 21
```

```
    Console.WriteLine("My name is " & myName)
```

```
    Console.WriteLine("I am " & myAge & " years old")
```

```
    Console.ReadLine()
```

```
End Sub
```

```
End Module
```

Task 1

5. Copy the above program. Test it to ensure it works.
6. Assign your own name and age to the appropriate variables.
7. Create a new Double variable to store your height in meters. Give it a value.
8. Write your height to the console after your name and age.

Introduction to Visual Basic | Selection

Module Module1

```
Sub Main()  
    Dim chosenNumber As Integer  
  
    Console.WriteLine("Choose a number: 1 or 2.")  
    chosenNumber = CInt(Console.ReadLine())  
  
    If chosenNumber = 1 Then  
        Console.WriteLine("Interesting choice...")  
    ElseIf chosenNumber = 2 Then  
        Console.WriteLine("That's my favourite number!")  
    Else  
        Console.WriteLine("That was not one of the options!")  
    End If  
  
    Console.ReadKey()  
End Sub
```

End Module

Task 1

1. Copy the above program. Test it to ensure it works.
2. Add to the program so that users can select a number 1 to 5. The output can be anything you like.

Task 2

Write a program that asks the user to enter their age. If their age is under 18 then say "Sorry, you are not old enough to watch this film."

Task 3

Write a program that asks the user to enter two numbers. Compare the first number with the second and then write one of three messages. Either the numbers are equal, the first is bigger, or the second is bigger.

Task 4

Write a program that asks the user to enter a number from 1 to 20. One of the following messages should then be written to the console.

- "Fizz" if the number is divisible by 3
- "Buzz" if the number is divisible by 5
- "FizzBuzz" if the number is divisible by 3 and 5

Introduction to Visual Basic | Iteration P1

Module Module1

```
Sub Main()  
  
    For count As Integer = 5 To 1 Step -1  
        Console.WriteLine(count)  
    Next  
  
    Console.ReadKey()  
  
End Sub
```

End Module

Task 1

1. Copy the above program. Test it to ensure it works.
2. Edit the program so that it prints out the numbers 0 to 20, counting up in 2s.

Task 2

Write a program that asks the user to enter their name and then displays it 5 times.

Task 3

Write a program that asks the user to enter a number between 1 and 12 and then displays its multiplication table over 12 lines. For example, if the user enters the number 5, the program should display:

```
1 x 5 = 5  
2 x 5 = 10  
3 x 5 = 15 ...
```

Introduction to Visual Basic | Iteration P2

```
Module Module1
```

```
    Sub Main()
```

```
        Dim number As Integer = 0
```

```
        Do While number < 10
```

```
            Console.WriteLine(number)
```

```
            number += 1
```

```
        Loop
```

```
        Console.ReadKey()
```

```
    End Sub
```

```
End Module
```

Task 1

1. Copy the above program. Test it to ensure it works.
2. Edit the program so that it prints out the numbers 10 to 100, counting up in 5s.

Task 2

Write a program that asks the user to enter their password. Unless the password entered is "Leventhorpe" the program should ask the user to enter it again. If the password is entered as "Leventhorpe" the program should let the user know that correct password has been entered.

Introduction to Visual Basic | String Handling

Module Module1

Sub Main()

```
Dim mySchool As String = "Leventhorpe"
```

```
Console.WriteLine("My school is called " & mySchool)
```

```
Console.WriteLine("There are " & mySchool.Length & " letters in " & mySchool)
```

```
Console.WriteLine("The 2nd letter in " & mySchool & " is " & mySchool.Chars(1))
```

```
Console.WriteLine("The first 3 letters are " & Left(mySchool, 3))
```

```
Console.ReadKey()
```

End Sub

End Module

Task 1

1. Copy the above program. Test it to ensure it works.
2. Change the value assigned to mySchool to "Hogwarts". Test it to ensure it works.
3. Change the program so that it displays the fourth letter of mySchool.
4. Add to the program so that it displays the last three letters of mySchool.
5. Add to the program so that it displays the second to fourth letter of mySchool.

Task 2

Write a program that asks the user to enter a word. It should then rearrange the word before displaying it, so that the last two letters are at the front. For example, the word "Dragon" would become "onDrag".

Develop the program so that it converts all of the letters in the rearranged word to uppercase.

Task 3

Write a program that asks the user to enter a word. It should then replace all vowels (a, e, i, o, u) with a star (*) before displaying it.

You will need to use selection and iteration to complete this task.

Introduction to Visual Basic | String Handling

Module Module1

Sub Main()

```
Dim firstName As String
Dim surname As String
Dim userName As String
```

```
Console.WriteLine("Please enter your first name: ")
firstName = Console.ReadLine()
```

```
Console.WriteLine("Please enter your surname: ")
surname = Console.ReadLine()
```

```
userName = firstName.Chars(0) & surname
```

```
Console.WriteLine("Your school username is: " & userName)
Console.ReadLine()
```

End Sub

End Module

Task 1

The above program asks the user to enter their first name and their surname. It then generates a username for them. The username is the first initial of the first name followed by the surname. For example, Harry Kane's username would be HKane and Dele Alli's surname would be DAlli.

1. Copy the above program. Test it to ensure it works.
2. Edit the program so that usernames are the surname followed by the first 2 letters of the first name. The code **Left(firstName, 2)** will return the first two letters of firstName.
3. Edit the program so that usernames are the same format as those at Leventhorpe. i.e. the year the student joined Leventhorpe – the student's surname – the first initial of the students first name.

Introduction to Visual Basic | Procedures

Module Module1

```
Sub PrimaryColours()  
    Console.BackgroundColor = ConsoleColor.Red  
    Console.WriteLine("Red")  
    Console.BackgroundColor = ConsoleColor.Yellow  
    Console.WriteLine("Yellow")  
    Console.BackgroundColor = ConsoleColor.Blue  
    Console.WriteLine("Blue")  
    Console.ReadKey()  
End Sub  
  
Sub Main()  
    PrimaryColours()  
End Sub
```

End Module

Task 1

1. Copy the above program. Test it to ensure it works.
2. Add to the PrimaryColours procedure so that it prints out five different colours instead of three.
3. Change the name of the PrimaryColours procedure to MyColours.
4. Change Main so that it calls the MyColours procedure twice.

Task 2

Write a procedure called AskName. When called it should ask the user their name, store it in a variable, and then say hello.

Task 3

Write a procedure called AskAge. When called it should ask the user their name, store it in a variable, and then respond with one of the following, depending on the age that has been input.

- Under 30: "You are young!"
- 30 to 50: "You are getting old!"
- Over 50: "You are old!"

*Remember, all data input via the keyboard is treated as string datatype. To ensure the ages entered are treated as numbers, you will need to use the **CInt()** function to convert them to integer datatype.*

Introduction to Visual Basic | Parameters

Module Module1

```
Sub CircleArea(radius As Double)
    Const pi As Double = 3.14159265359
    Dim area As Integer

    area = pi * (radius ^ 2)
    Console.WriteLine("The area is " & area)
End Sub

Sub Main()
    CircleArea(2)
    Console.ReadKey()
End Sub
```

End Module

Task 1

1. Copy the above program. Test it to ensure it works.
2. Edit the CircleArea procedure so that it receives diameter as a parameter, instead of radius.

Task 2

Write a procedure called SquareArea. It should receive the length of the square's sides as a parameter and calculate the total area of the square.

Task 3

Write a procedure called CylinderVolume. It should take the cylinder's radius and height as parameters and calculate the total volume of the cylinder.

Introduction to Visual Basic | Functions

Module Module1

```
Function PasswordTest(password As String) As String
    If password.Length() < 5 Then
        Return "Password is too short."
    Else
        Return "Password is good."
    End If
End Function

Sub Main()
    Console.WriteLine(PasswordTest("Leventhorpe"))
    Console.ReadKey()
End Sub
```

End Module

Task 1

1. Copy the above program. Test it to ensure it works.
2. Edit the PasswordTest function so that it returns a Boolean value instead of a string.

Task 2

Write a function called StringLength. It should take two string parameters and return the length of the largest as an integer.

Task 3

Write a function called Average. It should take three double parameters and return the mean average of the numbers entered.

Introduction to Visual Basic | Validation

Module Module1

```
Sub Main()  
    Dim age As Integer = 0  
  
    While age < 10 Or age > 18  
        Console.WriteLine("Enter your age: ")  
        age = CInt(Console.ReadLine())  
    End While  
  
    Console.WriteLine("Your age has been saved.")  
    Console.ReadKey()  
  
End Sub
```

End Module

Task 1

1. Copy the above program. Test it to ensure it works.
2. Edit the validation test so that it only accepts ages above 18.

Task 2

Write a program that asks the user to enter their name. It should only accept their name if it is more than three characters in length. Otherwise, it should tell them that the name entered is too short and ask them to do it again.

Task 3

Write a program that asks the user to enter their National Insurance (NI) number. It should only accept it if the format is LLNNNNNL. Otherwise, it should tell them that the NI number is in the wrong format.

Introduction to Visual Basic | Text Files P1

```
Module Module1
```

```
Sub Main()  
    Dim filePath As String = "C:\...\Projects\test.txt"  
    Dim myText As String = "This is my text."  
  
    My.Computer.FileSystem.WriteAllText(filePath, myText, True)  
End Sub
```

```
End Module
```

Task 1

1. Copy the above program assigning the appropriate string for filePath. Test it to ensure it works.
2. Edit the program so that it writes three different lines of text to a new text file. You will need to find out how to write a carriage return to the text file to complete this task.

Task 2

Edit the above program so that it asks the user to specify the name of the new text file being created.

Introduction to Visual Basic | Text Files P2

Module Module1

```
Sub Main()  
    Dim filePath As String = "C:\...\Projects\test.txt"  
    Dim fileHolder As System.IO.StreamReader  
    Dim line As String  
  
    fileHolder = My.Computer.FileSystem.OpenTextFileReader(filePath)  
    line = fileHolder.ReadLine()  
  
    While line <> Nothing  
        Console.WriteLine(line)  
        line = fileHolder.ReadLine()  
    End While  
  
    Console.ReadKey()  
  
End Sub  
  
End Module
```

Task 1

1. Create a new .txt file using Notepad. Make sure it has at least three lines of text.
2. Copy the above program assigning the appropriate string for filePath. Test it to ensure it works.
3. Edit the program so that it writes ***** to the console in between each line of the text file.

Task 2

Edit the above program so that it only writes lines beginning with "The" to the console. You may find it helpful to revisit the lesson on String Handling to complete this task.

Task 3

Write a program that asks the user to enter a keyword. It should then open a text file and write to the console each line that contains the keyword.

You will need to use the `.Contains()` method to search a for text in a particular string. The text being searched should be passed as a parameter.